

# General Characteristics

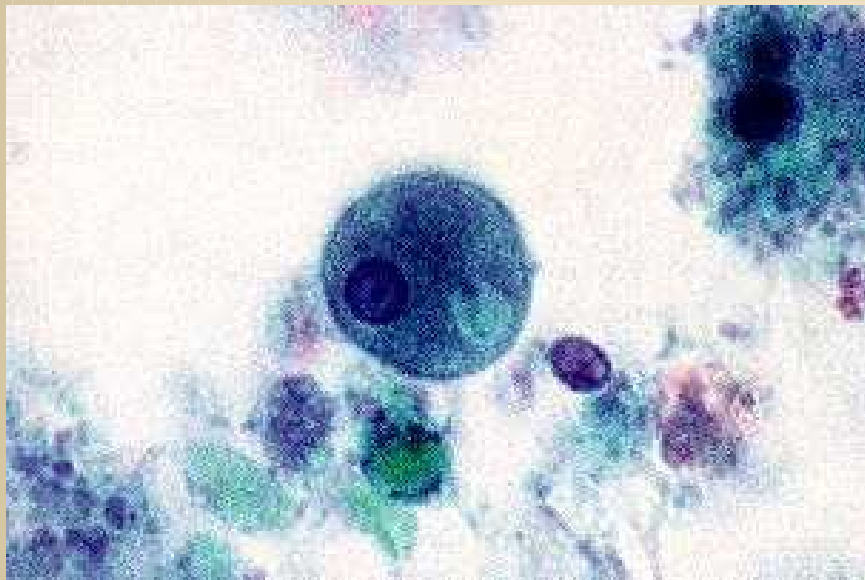
- 1a. Given statements, describe the general characteristics of parasites.
  - Terminology
  - Modes of transmission
  - Types of organisms



# General Characteristics

- Parasitology is the science that deals with organisms that take up their abodes, temporarily or permanently, on or within other living organisms for the purpose of procuring food, and with the relationship of these organisms to their hosts
- The term *parasite* is ordinarily applied to a weaker organism that obtains food and shelter from another organism and derives all the benefit from the association

# General Characteristics



*E. histolytica* trophozoite in fecal specimen

- Parasite-an organism dependent upon another for growth and survival
- Parasitism-a relationship in which a microorganism lives on or within a host and gains benefit at the expense of the host
  - Can be temporary or permanent

# General Characteristics

- Commensalism-One partner is benefited and the other is unaffected (aka colonization)
  - Symbiosis-Both cannot exist independently
  - Mutualism-Both organisms are benefited



*G. lamblia* trophozoite smiling at you

# General Characteristics

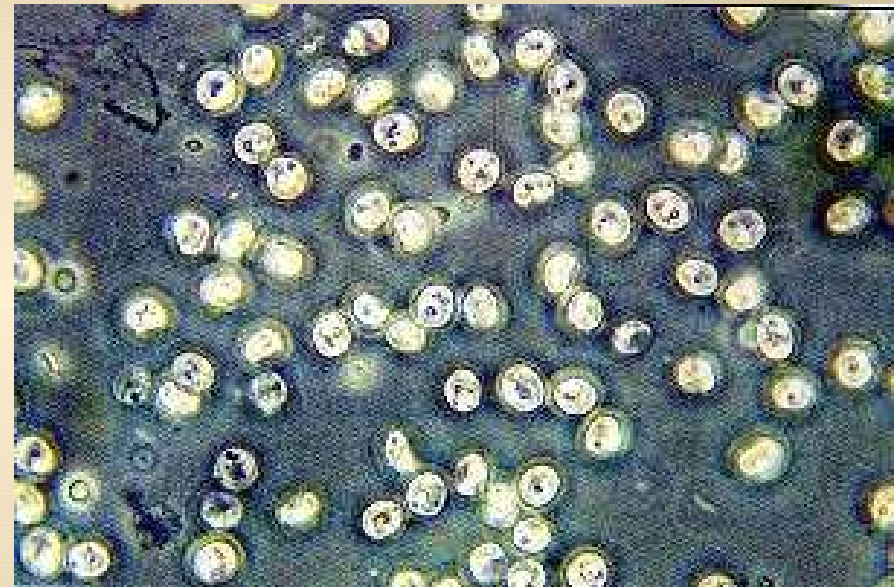


*T. vaginalis*, giemsa stained

- Definitive host-harbors the adult or sexual stage of the parasite
- Intermediate host-Part or all of the larval or asexual stage may take place in another animal
- Paratenic host-an animal that harbors the parasite in an arrested state of development
- Incidental host-Infected person is not necessary for the parasite's survival or development (human>trichinosis)

# General Characteristics

- Reservoir host-Other animals that harbor the same parasite
  - They ensure continuity of the parasite's life cycle and act as additional sources of human infection
- Vectors-animal that serve as a carrier of parasites



Oocysts of *Cryptosporidium* under phase contrast



# General Characteristics

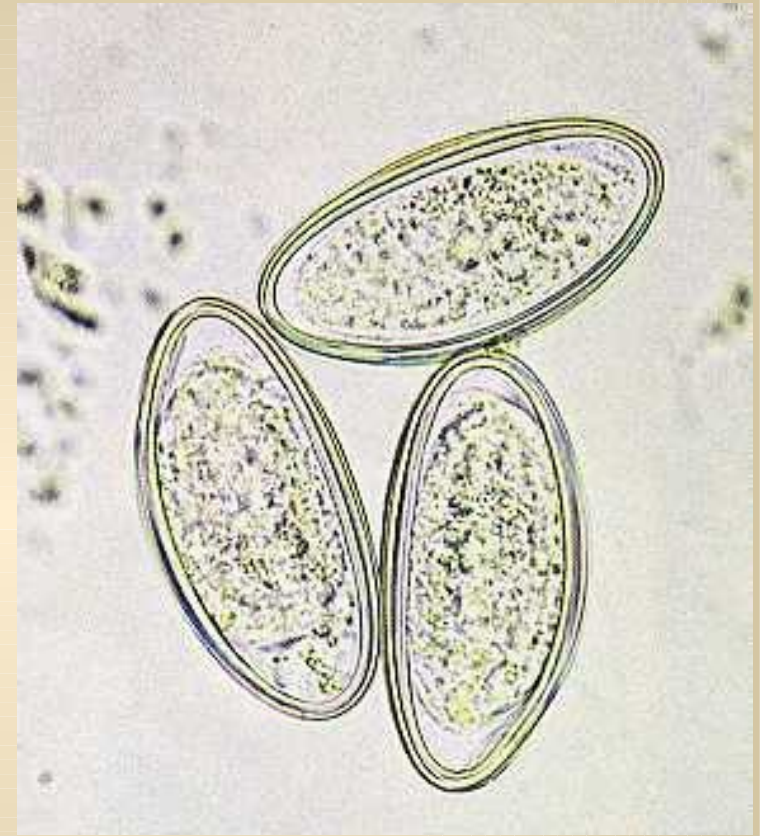


*T. cruzi*; causes Chagas disease

- Pathogen-a microorganism capable of causing an infectious disease
- Pseudoparasite-an artifact that resembles a parasite

# General Characteristics

- Modes of transmission:
  - Fecal-oral route
  - Food/Water/Soil
  - Direct skin penetration
  - Ingestion of larvae
  - Arthropod vectors
  - Rarely: Mother to offspring
  - Direct/Indirect contact
  - Influx of refugee population
  - Increase in # of compromised patients (AIDS)



*E. vermicularis*, eggs



# General Characteristics



A. lumbricoides, egg

- Taxonomy
  - Established and classified according to the International Code of Zoological Nomenclature
  - 5 Kingdoms (KPCOFGS)
    - Monera
    - Protista
    - Fungi
    - Plantae
    - **Animalia**

# General Characteristics

- Specific groups of parasites
  - Protozoa (first animals)
    - All exhibit some form of motility
    - Actively seek and consume bacteria, other protists, and detritus
    - They are subdivided into phyla on the basis of how they feed and move
- Vary in size from 1.5  $\mu\text{m}$  to 50 mm
- Free-living organisms
- Division is diverse
  - **Binary Fission**
  - Sexual reproduction
- Most protozoa have an anaerobic metabolism
- Survival is largely due to their highly developed reproductive powers
- Examples: *Plasmodium*, *Leishmania*, *Trypanosoma*

# General Characteristics

- Class Sarcodina (flesh, fleshy tissue or muscle)/Amebas
  - Move by pseudopodia
  - Primarily found in the intestinal tract
  - Irregular and constantly changing shape
  - Found in water, soil, damp environments
  - Examples: *E. histolytica*, *E. coli*, *E. hartmanni*, *E. gingivalis*, *E. nana*, *D. fragilis*, *I. butschii*, *Naegleria spp.*
- Class Mastigophora (flagellates)
  - Able to move in all directions due to undulating membrane
  - May have a kinetoplast to aid in movement
  - Examples: *L. donovani*, *L. tropica*, *L. brazilliensis*

# General Characteristics

- Class Ciliata (ciliates)
  - Use cilia to move and feed
  - Most live in fresh water
  - Generally reproduce by binary fission
  - *B. coli* is the only parasite common to humans
- Class Sporozoa (new Apicomplexa)
  - Disseminate as tiny infectious cells called sporozoites
  - Have intricate life cycles with both sexual and asexual stages
  - Often require two or more different host species for completion
  - Examples:
    - Intestinal- *I. hominis*, *I. belli*
    - Hemosporozoites- *T. gondii*, *Cryptosporidium* spp., *Pneumocystis* spp., *Babesia* spp., *Plasmodium* spp.

# General Characteristics

- Phylum Nematoda

- Cylindrical worms with tapered ends
- Called roundworms
- Found in most aquatic
- 80,000 species Identified
- Complete digestive tract
- Reproduction is usually sexual and the sexes are separate in most species
- Females are generally larger than males
- Fertilization is internal, and a female may deposit 100,000 or more fertilized eggs per day
- Among the most numerous of all animals in both species and individuals
- Play an important role in decomposition and nutrient cycling
- Examples: *E. vermicularis*, *T. trichiura*, *A. lumbricoides*, *N. americanus*





# General Characteristics

- Phylum Platyhelminthes
  - About 20,000 species
  - aka “Flat worms”
  - Live in marine, freshwater, and damp terrestrial habitats
  - Flatworms include the flukes and the tapeworms
  - Range in size from microscopic to certain tapeworms over 20 m long
  - They are bilaterally symmetrical with unidirectional movement
- Divided into:
  - Tubellaria (free-living)
  - Trematoda (flukes)
  - Monogenea (flukes)
  - Cestoda (tapeworms)
- No digestive tract
- Contain a scolex and strobila
- Examples: *D. latum*, *T. saginata*, *T. solium*, *H. nana*, *H. diminuta*, *D. caninum*, *S. mansoni*, *S. japonicum*, *S. haematobium*, *F. hepatica*, *C. sinensis*, *F. buski*, *P. westermani*





# General Characteristics

- Phylum Arthropoda (jointed feet)
  - Contains more species than all other phyla (1 million) and is humanity's principal competitor for this earth
  - Transmit bacterial, rickettsial, spirochetal, viral, and animal parasitic diseases
  - Sexes are usually separate
- Five classes
  - Onychophora (noninjurious)
  - Myriapoda (poisonous millipedes and centipedes)
  - Crustacea
  - Insecta
  - Arachnida
- Estimated population about 1 billion billion ( $10^{18}$ )
- Considered as the most successful phylum of animals ever to live

# Summary

- 1a. Given statements, describe the general characteristics of parasites.
  - Terminology
  - Modes of transmission
  - Types of organisms (Taxonomy)